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RESEARCH ARTICLE

New records of long-legged flies (Diptera, Dolichopodidae) from Wrangel Island Nature Reserve (Chukotka AD, Russia)

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Abstract

New original data on five Dolichopodidae species from the Wrangel Island resulted from the 2015–2019 surveys in the Wrangel Island State Nature Reserve are presented. As a result of this study, a new material of Dolichopodidae has been identified, being collected from the new localities in the Wrangel Island Nature Reserve, and a new species *Rhaphium tripartitum* has been found on the Island. The present research excludes *R. nigrum* from the Chukchi fauna and expands the *Dolichopus terminasianae* area westward to the Yamal Peninsula.

Keywords

Arctic, Diptera, Dolichopodidae, ecology, fauna, new record, Palaearctic Region, Wrangel Island

Introduction

The Dolichopodidae fauna of the Wrangel Island has been recently reviewed by Grichanov and Khruleva (2018), who have reported there five species, i.e. *Chrysotus komovi* Negrobov, Barkalov et Selivanova, 2014, *Dolichopus humilis* Van Duzee,

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1921, *Dolichopus terminasianae* Negrobov, Selivanova et Maslova, 2011, *Hydrophorus alpinus* Wahlberg, 1844, and *Rhaphium beringiense* Negrobov et Vockeroth, 1979, having mainly a hypoarctic or even circum-arctic distribution. Only two sites in the warmest central part of Wrangel Island (the upper reaches of Neizvestnaya River and the middle flow of Mamontovaya River) have been thoroughly studied. This number is low in comparison with 36 species known in the Chukchi mainland fauna of this species family having significant boreal distribution (Grichanov 2018).

Material and methods

The material for this study has been collected by O.A. Khruleva, L.F. Volkova (Simon) and U.V. Babiy, the staff members of the Wrangel Island Nature Reserve. Flies have been collected during the summer seasons of 2016 (hand collection), 2018 (by use of yellow pan traps) and 2019 (net sweeping, yellow pan traps and hand collection). The main collection sites were as follows: the Thomas Mt., the middle flow of Neozhidannaya River, the Tundrovaya Mt., the upper reaches of the Neizvestnaya River, the middle-upper reaches of the Krasnyi Flag River, the Rogers Bay, the Vyuchnyi brook and the Chertov Ovrag (Fig. 1). In addition, a careful sorting of yellow pan traps' residues from the 2015 expedition has revealed one more species

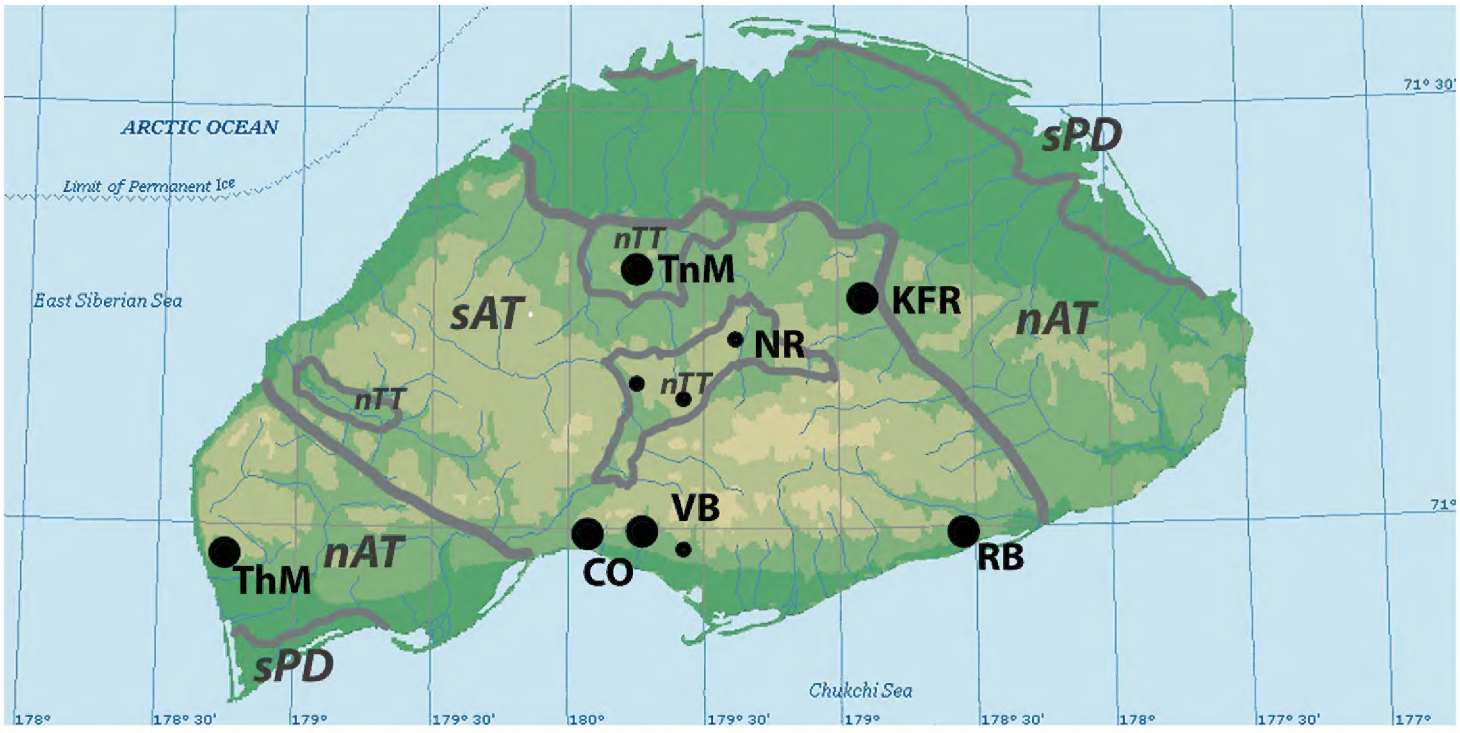

Figure 1. Points of new records of Dolichopodidae on Wrangel Island. Small circles – species collection points in 2015: **NR** – Upper reaches of Neizvestnaya River. Big circles – species collection points in 2016–2019: **ThM** – Thomas Mt.; **CO** – Chertov Ovrag; **VB** – Vyuchnyi brook; **RB** – Rogers Bay environs; **TnM** – environs of Tundrovaya Mt.; **KFR** – middle-upper flow of Krasnyi Flag River. Grey lines – boundaries of the zonal differentiation of vegetation (according to Kholod 2013): **nTT** – the Northern subzone of typical tundra; **sAT** – southern variant of the Arctic tundra subzone; **nAT** – Northern Arctic tundra subzone; **sPD** – southern variant of the zone of polar desert.

on the Island. This paper presents the new species records in detail and notes on the *Rhaphium tripartitum* (Frey, 1913) distribution.

Information on the world distribution for each species are presented according to the Grichanov (2017). The type localities are provided and the country lists are arranged alphabetically. The material studied will be deposited at the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZIN). Additional reference material on *Dolichopus terminasianae* and *Rhaphium tripartitum* from the ZIN collection is also studied. Photos of some habitats are kindly provided by U.V. Babiy.

New records of Dolichopodidae

Chrysotus komovi Negrobov, Barkalov et Selivanova, 2014

Reference. Grichanov and Khruleva 2018: 39, Fig. 2.

Material. 1♂, 1♀, Upper reaches of the Neizvestnaya River, 71°13'N, 179°19'W, moderately humid loamy hummocky ridge with lichen-willow-dryad-sedge-moss cover, yellow pan traps, 22–22.07.2019, O.A. Khruleva; 43♂♀, environs of Tundrovaya Mt., 71 18.231'N 179 53.398'W, damp floodplain terrace with a willow-dryad-moss cover, 16–22.07.2018; 1♂, the same locality, 71.29776N, 179.79578W, loamy high shore with a sparse grass and wormwood cover, yellow pan traps, 6-9.07.2019,

Figure 2. Environs of Tundrovaya Mt. Loamy high shore with a sparse grass and wormwood cover; a site where *Chrysotus komovi* and *Rhaphium beringiense* were collected. Photo by U.V. Babiy.

U.V. Babiy; 1♂, the same locality, 71.29771N, 179.79791W, pebble floodplain without vegetation, near the water, yellow pan traps, U.V. Babiy, 7–11.07.2019.

Notes. The species has been previously collected at the upper reaches of the Neizvestnaya River (Grichanov and Khruleva 2018). It is found at environs of the Tundrovaya Mt. for the first time (Fig. 2).

Distribution. Type locality: Russia: Krasnoyarskii Krai, Taimyr Reserve, Ary-Mas field station, left bank of river Novaya. Palaearctic: Russia (Chukotka mainland, Wrangel Island, Taimyria).

Dolichopus terminasianae Negrobov, Selivanova et Maslova, 2011

Reference. Grichanov and Khruleva 2018: 40, Fig. 4.

Material. 2♂, 5♀, Upper reaches of the Neizvestnaya River, 71°13'N, 179°19'W, moderately humid and dry biotopes with willow-sedge-moss and "tundra-steppe" forb-sedge cover, yellow pan traps, 20–22.07.2019, O.A. Khruleva; 1♀, Vyuchnyi brook, 71.003889°N, 179.703667°W, the lower part of the southern gravelly slope with a spotted lichen-moss-herb-sedge "tundra-steppe" cover, hand collection, 24.07.2019, O.A. Khruleva.

Figure 3. Vyuchnyi brook. Southern gravelly slope of a hill with a "tundra-steppe" plant community; a site where *Dolichopus terminasianae* and *Hydrophorus alpinus* were collected. Photo by O.A. Khruleva.

Additional Material. 1♂, Middle Yamal: [Obskaya Guba], River Nurma-Yakha (=Nulmayakha), Malaise trap, 27.07–1.08.1991. (No name of collector; ZIN).

Notes. The species has been previously collected only at the warmest central part of the Island (upper reaches of the Neizvestnaya River) (Grichanov and Khruleva 2018). In the southern part of the Island (Fig. 3), it is found for the first time (only one specimen in a rather warm biotope at the southern slope near the Vyuchnyi brook).

Distribution. Type locality: Russia: Magadan oblast, Aborigen peak, 100 km N Ust'-Omchug, Annachag ridge, Olen' river. Palaearctic: Russia (Chukotka mainland, Wrangel Island, Magadan, Yakutia, Yamalia). First record from the Yamalo-Nenets Autonomous Okrug, the westernmost region of distribution.

Hydrophorus alpinus Wahlberg, 1844

Reference. Grichanov and Khruleva 2018: 40, Fig. 5.

Material. 1♂, 1♀, Thomas Mt., 70°57'N 178°43'E, gravel southern slope with spotted grassy-forb and herb-dwarf willow-moss cover, 11–31.07.2016, L.F. Volkova; 1♂, middle-upper reaches of Krasnyi Flag River, 71°16.952'N 178°50.154'W, wet plot in a river valley with continuous grass-dryad-sedge-moss hummocks, 4–17.07.2016, L.F. Volkova; 1♂, environs of Tundrovaya Mt., 71.29776 N, 179.79578 W, loamy high shore with a sparse grass and wormwood cover, yellow pan traps, 6–9.07.2019, U.V. Babiy; 1♀, Chertov Ovrag, 70.987833°N, 179.841611°W, the lower part of the loamy-gravelly slope of the southern exposure with a spotted forb-moss-willow-dryad cover, sweeping, 26.07.2019, O.A. Khruleva; 3♂♂, 4♀♀, Vyuchnyi brook, 71.003889°N,

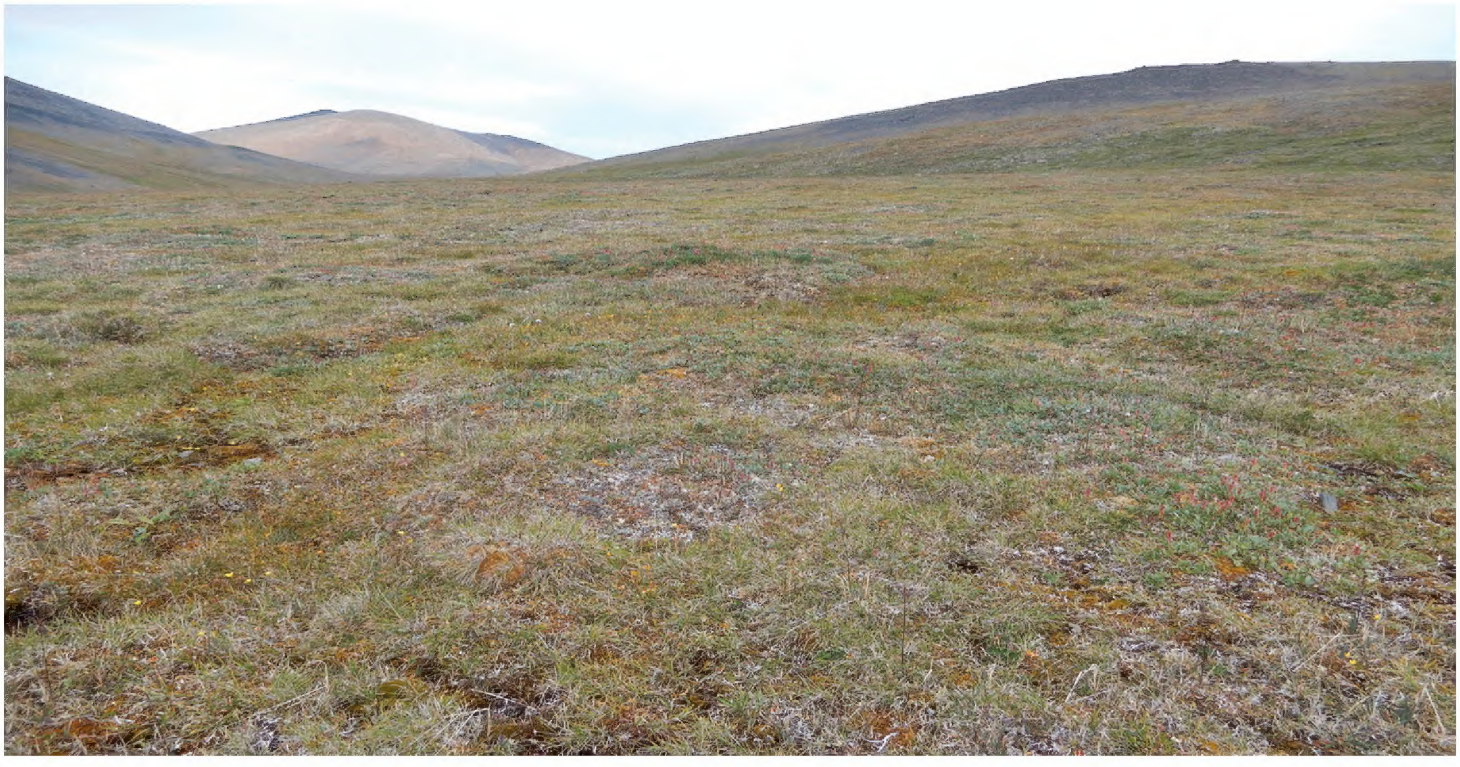

Figure 4. Vyuchnyi brook. Base of the hill with a willow-sedge-moss-dryad hummocky cover; the site with the largest number of *Hydrophorus alpinus*. Photo by O.A. Khruleva.

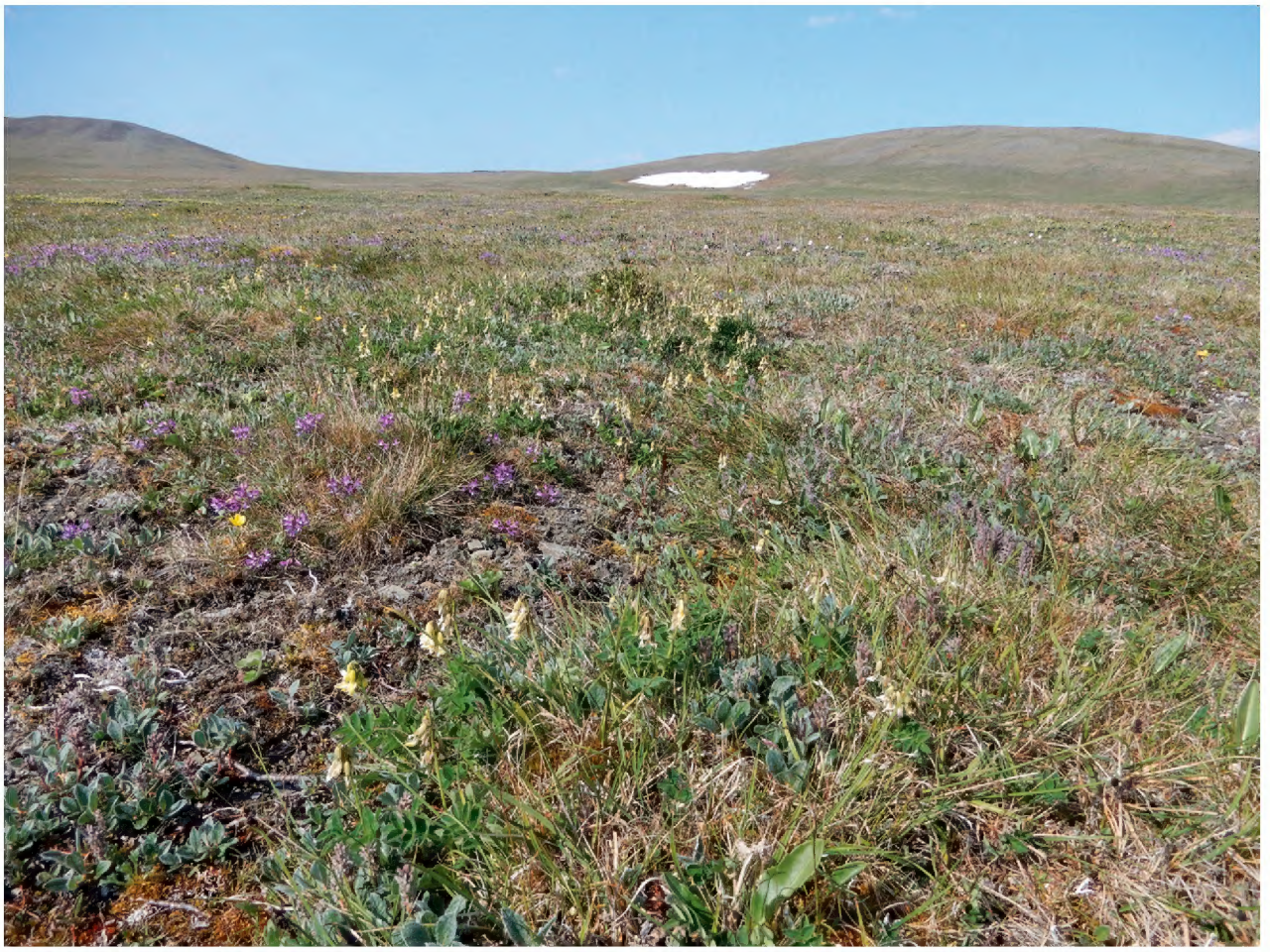

Figure 5. Rogers Bay environs. Middle part of gravel-loamy foothill ridge with spotted willow-sedge-moss cover; a site where *Hydrophorus alpinus* was collected. Photo by O.A. Khruleva.

179.703667°W, base and southern slope of a hill with willow-sedge-moss-dryad hummocky cover and spotted lichen-moss-herb-sedge cover, 24.07.2019, sweeping and hand collection, O.A. Khruleva; 2♂♂, Rogers Bay env., 70.984778°N, 178.494139°W, moderately moistened middle part of gravel-loamy foothill ridge with spotted willow-sedge-moss cover, sweeping, 11.07.2019, O.A. Khruleva.

Notes. *Hydrophorus alpinus* is the commonest species on the Island, but previously only one specimen has been collected outside the warmest central part (Grichanov and Khruleva 2018). In 2016 and 2019, it was discovered in six new plots (Figs 3–5) located mainly outside the warmest inland areas, including the coast of the Island.

Distribution. Type locality: Sweden: "Walli et Snjerack prope Quickjock". Palaearctic: Finland, Norway, Russia (Arkhangelsk, Chukotka mainland, Wrangel Island, Leningrad, Murmansk, Nenetsia, Yakutia, Yamalia), Sweden; Nearctic: Canada, USA.

Rhaphium beringiense Negrobov et Vockeroth, 1979

Reference. Grichanov and Khruleva 2018: 41, Fig. 6.

Material. 1♂, 1♀, Upper reaches of the Neizvestnaya River, 71°13'N, 179°19'W, low pebble floodplain with oozy alluviums and sparse plant beds, yellow pan traps,

Figure 6. Upper reaches of the Neizvestnaya River. "Tundra-steppe" plant community; a site where *Rhaphium tripartitum* was collected. Photo by O.A. Khruleva.

6–13.07.2015, O.A. Khruleva; 2♂, environs of Tundrovaya Mt., loamy high shore- with sparse grass and wormwood cover, yellow pan traps, 6–9.07.2019, U.V. Babiy.

Notes. The species was previously collected at the Upper reaches of the Neizvestnaya River (Grichanov and Khruleva 2018) and at the Ushakovskoe village (Negrobov et al. 2012). It is found at the environs of Tundrovaya Mt. for the first time (Fig. 2).

Distribution. Type locality: Russia: Magadan oblast, Hazjin river. Palaearctic: Russia (Altai Republic, Kamchatka, Magadan, Taimyria, Wrangel Island); Nearctic: USA (Alaska).

Rhaphium tripartitum (Frey, 1913)

Figs 7–9

Material. ♂, Upper reaches of the Neizvestnaya River, 71°13'N, 179°19'W, dry gravel southern edge of river terrace covered with forb-sedge "tundra-steppe" community (Fig. 6), yellow pan traps, 4–15.07.2015, O.A. Khruleva.

Additional Material. 1♂, Chukotka: Krasnoarmeiskii, Chaunsky District, 10.07.1963, K. Gorodkov (ZIN).

Notes. *Rhaphium tripartitum* was originally described (Lundström and Frey 1913) from the North Russian locality Kambalnitsa (written later as Kambalnista)

and probably was not recorded in the Palaearctic Region until recently. The only record of the species from the Nearctic Region (Northwest Territories of Canada) belonged to Vockeroth (1952). The species distribution was erroneously described in the Palaearctic Catalog (Negrobov 1991) as "Type-locality: Kambalnista (?Finland). Distr.: Europe: North Europe; USSR: NET (Murmansk region, Leningrad region); North America". However, there were no original materials published for *R. tripartitum* from either Finland or Murmansk and Leningrad Regions. It was not included into the checklists of Finland (Frey 1915; Kahanpää 2014), Leningrad (Stackelberg 1962) and Murmansk Regions (Grichanov 2004). In fact, the type locality of the species is a small Kambalnitsa River (68°19'N, 46°02'E) on the north-eastern coast of the Kanin Peninsula between the White Sea and the Barents Sea, belonging now to the Nenets Autonomous Okrug (formerly a part of the Arkhangelsk Region).

Recently Negrobov et al. (2012) have found *R. tripartitum* on the Taimyr Peninsula (Zakharova Rassokha River, 72.7°N, 101.08°E). Negrobov has identified also a male from the middle part of the Yamal Peninsula as *R. tripartitum* (ZIN collection; Negrobov, pers. comm.).

Grichanov (2018) has reported the Nearctic *Rhaphium nigrum* (Van Duzee, 1923) from the Chaunskii District of Chukotka mainland, comparing a specimen in his hands with the original description of the species (Van Duzee 1923). This species was described from Alaska (Katmai and Savonoski, Naknek Lake) and was

Figure 7. *Rhaphium tripartitum* (Frey, 1913) male collected from the Chaunskii District of Chukotka mainland, habitus. Photo by I.Ya. Grichanov.

Figure 8. *Rhaphium tripartitum* (Frey, 1913) male collected from the Wrangel Island, habitus. Photo by I.Ya. Grichanov.

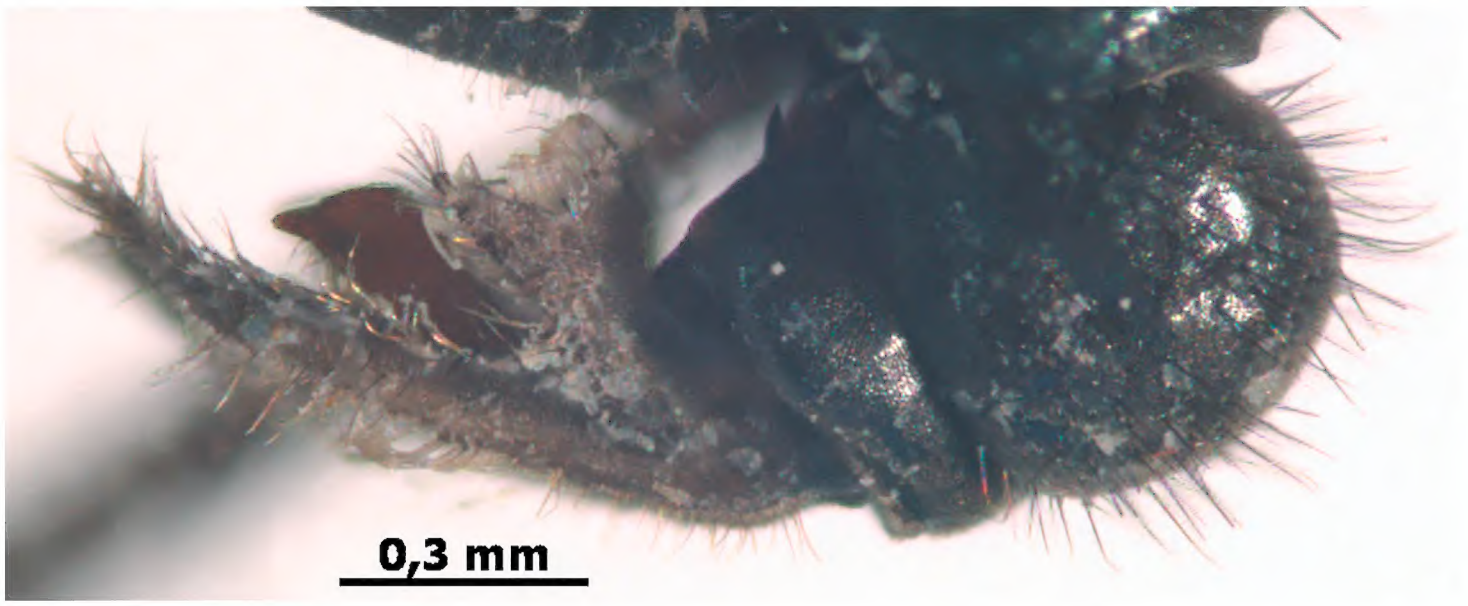

Figure 9. *Rhaphium tripartitum* (Frey, 1913) male collected from the Wrangel Island, hypopygium. Photo by I.Ya. Grichanov.

never recorded again (Pollet et al. 2004). A careful re-examination of the *R. nigrum* description has revealed that the two Chukchi males examined (from the Chaunsky District and the Wrangel Island) must be considered *R. tripartitum*. A male from the Chaunsky District (Fig. 7) is somewhat lighter than a male from the Wrangel Island (Fig. 8) because of its long-term storing in the museum collection (about 60

years). The hypopygium (Fig. 9) is identical in both specimens. Nevertheless, the types of *R. nigrum* must be appropriately redescribed and illustrated, because the two names may be synonymous.

Distribution. Type locality: Russia: Nenetsia, Kambalnitsa River. Palaearctic: Russia (Chukotka mainland, Wrangel Island, Nenetsia, Taimyria, Yamalia); Nearctic: Canada (Northwest Territories).

Conclusion

As a result of this study, a new material of Dolichopodidae has been identified, being collected from the new localities in the Wrangel Island Nature Reserve, and a new species *Rhaphium tripartitum* has been found on the Island. The present research excludes *Rhaphium nigrum* from the Chukchi fauna and expands the *Dolichopus terminasianae* area westward to the Yamal Peninsula.

Thus, six species of the family are now known from the Wrangel Island. New distribution data for five species are provided. The largest number of new finds is recorded for *Hydrophorus alpinus* that confirms its wider distribution on the Island than that of other species (Grichanov and Khruleva 2018; this paper). New data show that *H. alpinus* lives even in the northern variant of Arctic tundra subzone. It is often found outside wet troughs and river valleys, i.e. in rather dry habitats. Currently, three species are known from the colder coastal areas of the Island covered with the southern variant of the Arctic tundra subzone (Fig. 1), one of the species, *D. terminasianae*, is noted here for the first time. The fauna of the warmer central part (the Northern subzone of typical tundra) is also increased by one species (*Rhaphium tripartitum*). All six species are known from one locality only (the upper reaches of the Neizvestnaya River), where a favourable mesoclimate is combined with abundance of humid habitats.

Five of six species (with the exception of *R. beringiense*) are also known from the mainland of Chukotka (Grichanov 2018). Of these, only *D. terminasianae* is widespread in Chukotka, found in both the tundra and more southern landscapes, including the subzone of the northern taiga. The remaining species are collected almost exclusively in the North of Chukotka (Pevek environs, Komsomolsky and Krasnoarmeisky districts, Cape Heart Kamen, Kolyuchinskaya Bay), sometimes on the southern coast of the Chukotka Peninsula (*Dolichopus humilis* in the Egvekinot region). In total, 13 species are known in the North of Chukotka, but no more than six species are known in local faunas (as in the vicinity of Pevek). The peculiarities of the distribution of Dolichopodidae in Chukotka mainland indicate the nonrandomness of such composition of the Wrangel Island fauna, as well as comparable species richness with the local faunas of northern Chukotka mainland.

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Author contribution statement

Igor Ya. Grichanov and Olga A. Khruleva contributed equally to the study design, data analysis and manuscript writing.

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